Yellow-Orange; tail and feet whitish; underparts whitish, with plumbeous underfur showing. Size small; smaller than typical *T. b. aureus;* rostrum long and broad (but condition in type specimen is atypical), relatively larger than that of *T. b. aureus*.

Comparisons.—*Thomomys bottae latirostris* needs close comparison only with *T. b. aureus*, from which it differs in paler color (Pale Yellow-Orange rather than Cinnamon-Buff) and in a smaller skull with a relatively broader rostrum.

Measurements.—Three males, two adults and one subadult, from 4½ to 5 miles N Cameron give the following respective measurements: total length, 212, 226, 206; tail, 61, 74, 60; hind foot, 32, 30, 30; ear, 5, 5, 5; basilar length, 33.0, 32.7, 31.7; zygomatic breadth, 23.1, 23.3, 20.9; mastoidal breadth, 19.7, 19.7, 19.6; length of nasals, 15.1, 12.6, 12.7; least interorbital breadth, 7.1, 6.6, 6.9; length of diastema, 12.9, 12.6, 11.2; length of rostrum, 17.3, 15.4, 15.4; breadth of rostrum, 8.6, 8.1, 8.2; palatilar length (exclusive of palatal spine), 21.2, 21.0, 20.5.

Remarks.—Goldman (*op. cit.*) considers the type locality of Tanner Crossing as about three miles above Cameron. However, Barnes in his *Arizona place names* (Univ. Arizona Bull. **6**: 437. 1935) says this crossing of the Little Colorado was near the Cameron bridge, and thus at Cameron itself.

One specimen (no. 161183, U. S. Biol. Surv. Coll.) from Tuba City, Coconino County, Ariz., closely approaches specimens of *latirostris* from near Cameron. Additional material from Tuba City may indicate that specimens from there are referable to *T. b. latirostris*.

Specimens examined.—Arizona: *Coconino County:* 5 miles north of Cameron, 1 (Univ. Illinois, Mus. Nat. Hist.); 4½ miles north of Cameron, 2 (Univ. Illinois, Mus. Nat. Hist.); Little Colorado River, Painted Desert, 1 (type, U. S. Biol. Surv. Coll.).

MALACOLOGY.—*Shell structure of West American Pelecypoda.*

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From an examination of numerous specimens from the major pelecypod families, it appears that the shells are composed of two types of deposits. One is secreted by the general surface of the mantle and is here termed palliostracum; the other is secreted over the muscle attachment areas and is here termed myostracum.

The palliostracum is composed, in addition to the periostracum, of three major layers, the ectostracum, mesostracum, and endostracum (Fig. 1). The ectostracum forms the outer surface of the shell, including the margins. The mesostracum emerges on the inner surface outside the pallial line and includes the hinge. The endostracum forms the inner surface within the pallial line. A seemingly two-layered shell may result from combination of the outer two (mesectostracum) or inner two (mesendostracum) major layers. Sometimes all three layers are structurally identical, as in *Lyropecten*.

The myostracum is divisible into several components, the most important of which are: the pallial myostracum, a thin deposit secreted at the pallial line and the adductor myostraca, similar deposits secreted in the scars of the adductor muscles. Additional myostracal deposits are formed in the scars of lesser muscles, such as the retractor pedis.

The terms hypostracum and ostracum, hitherto employed in the nomenclature of the shell layers of pelecypods, have been discarded, for they refer to a "two-layered shell." Moreover, although Thiele (1903), the originator of the terms generally used the term hypostracum for the "inner layer" and ostracum for the "outer layer," subsequent authors (Jameson, 1912; Coker et al.,

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1919; Gutsell, 1930; Newell, 1937) have used these terms with different connotations, usually referring the hypostracum to the adductor myostracum, so that the status of the terms is now very uncertain.

The pelecypods examined may be arranged into three major groups according to shell structure. These groups are:

1. The nacroprismatic group. Primitive pelecypods typically with a nacreous mesendostracum and a prismatic ectostracum.
2. The foliated group. Pelecypods typically with one or more foliated layers.
3. The complex-lamellar group. Pelecypods typically with a complex endostracum and a crossed-lamellar mesectostracum.

The nacroprismatic group includes the anisomyarians (except the Dreissenidae), the Nuculacea, Unionacea, Trigoniidae. Periplomatidae, Pandoridae and Lyonsiidae. The foliated group includes the monomyarians. The complex-lamellar group includes the heterodonts, the Arcacea and the Dreissenidae.

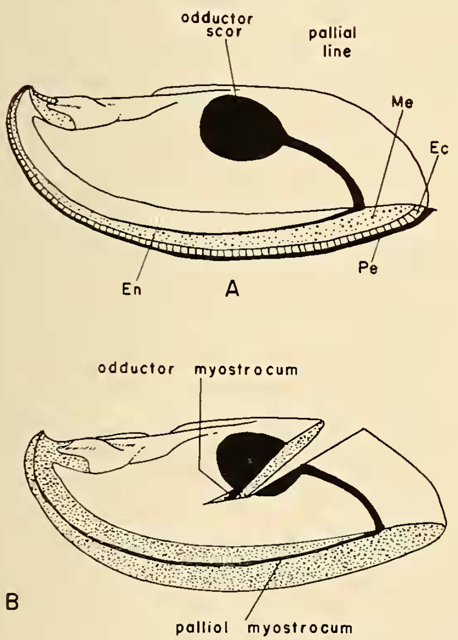

Fig. 1.—*a*, Longitudinal section and inner surface of a pelecypod valve showing positional relationship of palliostracal layers to each other, as well as to the pallial line and adductor scar; *b*, longitudinal and oblique sections and inner surface of a pelecypod valve showing pallial and adductor myostraca. Palliostracum stippled. (In this figure and in Fig. 2, Ec = ectostracum; En = endostracum; Me = mesostracum; Pe = periostracum.)

The structure of the various families and genera in each group may show various modifications from the typical structure of the group.

The shells of certain pelecypods are markedly tubulate. The distribution of the tubules and at times their general aspect and density vary greatly between families or superfamilies but are generally relatively constant within such groups.

The distribution of the tubules in some families of pelecypods follows (Fig. 2):

Tubules in the endostracum only—Chamidae, Lucinidae, most Mytilidae.

Tubules in the endostracum and mesostracum—Carditidae, Lyonsidae.

Tubules apparently present in all three layers—Spondylidae.

Tubules originating only in the area surrounded by the pallial line but penetrating all three layers—Arcacea.

In the first three cases the tubules must have originated at the same time as the surrounding shell substance, while in the last case the portion of the tubules within the mesectostracum was formed, probably by resorption, after deposition of the surrounding shell substance. The tubules formed together with the shell substance are more or less perpendicular to the growth planes in that substance. Tubules resulting from resorbtion do not, however, show a constant relationship to the growth planes, but tend to be perpendicular to the base of the layer or set of layers into which they have been intruded.

Tubules have been observed in association with all types of shell structures except the granular and homogeneous. The prismatic structure seems to be the only one where there is a regular relationship between the position of the tubules and the structural elements. In some forms, the tubules occur mostly between the prisms, in others within the prisms, but they have never been observed to occur at random both within and without these structural elements.

The structural elements in the pelecypod shell may be variously related positionally to the shell surfaces and the growth lines.

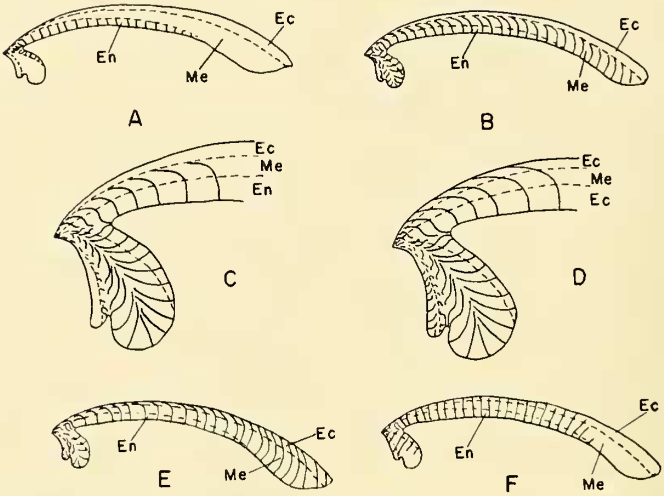

FIG. 2.—*a*, Longitudinal section of a pelecypod valve, showing endostracal tubules; *b*, same as above, showing mesendostracal tubules; *c*, distribution of tubules as in *b*, showing in detail the tubulation pattern in the apical region; *d*, longitudinal section of the apical region, tubules occurring in all three layers; *e*, longitudinal section through the whole valve, showing tubules occurring in all three layers; *f*, longitudinal section of a pelecypod, tubules in all three layers but appearing only within pallial line.

They may be vertical (perpendicular to the outer surface), horizontal, or oblique in all possible directions, or they may even be spirally arranged like the folia in many foliated pelecypods. In the pectinids, for example, where most genera show some degree of spiraling of the folia, the spirals are twisted clockwise in some genera, counterclockwise in others.

The classification of ribbing and related structures employed here is based in part on morphology and in part on genesis, and is as follows:

1. Nonadditive ribbing, produced by deformations of the mantle margin, either plications or lobations, or both.

2. Additive ribbing, featuring mainly relatively rapid secretion on limited areas of the shell.

3. Composite ribbing, formed by components of both the previous types, with a non-additive framework on which are secreted additive structures, whose position is directly related to and in most cases apparently determined by that of the nonadditive components.

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